



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Loren J. Newton	Project Number 31521
Project Title Forces on the Road: Are You Inclined to Bank on a Curve?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective is to investigate how the bank, incline, and curve angle on a roadway affect how easily and safely a vehicle navigates through the curve. I set my goal to visualize my analysis (since I did not come across any references of such during the course of my research) of the combined effects of inclines, banks, and curves on the forces of work in motion.</p> <p>Methods/Materials PART 1: Construct a model roadway and record the time taken for the R/C vehicle to travel, at a constant speed, the same curve but with different combination settings of 9 incline angles and 9 bank angles. PART 2: Derive from Vectors Diagram and 3D Vectors Model to realize the the resultant force (by the various combination of incline and bank angles) that the driving force (by the vehicle) was altered and needed to overcome.</p> <p>Results In general, it took a shorter time to travel the curve with a decreasing incline, increased bank into the curve and vice versa with an increasing incline. The same pattern of results held for both wider and narrower curve. From the 3D Vectors Model, the formula for the magnitude of the resultant force and the angle that the driving force had been swayed was derived.</p> <p>Conclusions/Discussion My test results agreed with my vectors analysis. The driving force on the road is altered by the act of the gravitational force on inclines and banks of the road. A wider curve and larger bank into the curve is more efficient for driving in roadway design, but more control is needed by the driver during a declining path.</p>	
Summary Statement To investigate and analyze the effect of incline and bank angles in negotiating a curve.	
Help Received My dad helped shop for material and supervised use of power tools during construction. My mom helped with the display board.	